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A MONOGRAPH

ON THE

GENERA

Zethus, Cybele, Encrinurus,

AND

CRYPTONYMUS.

By A. W. VOGDES, U. S. A.,
CORRESPONDENT OF PHILADELPHIA AND CHICAGO ACADEMIES OF NATURAL SCIENCES.

CHARLESTON, S. C.
1878.

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The Genus Cryptonymus, Eichwald, 1840.

HISTORICAL NOTICE.

In the year 1711, Herrmann published, in his Maslographia, the following description: "*Pectunculites marmoreus trilobus imbricatus in medio dorsi punctatus, et striis exiguis per transversum notatus,*" and figures (plates 9 and 11, fig. 50) the pygidium of *Cryptonymus punctatus.* He represents a specimen with 6 tubercles on the axis, and 9 pleuræ. These figures are the first that we possess of this trilobite.

In 1759, Linnæus figures (table 1, fig. 2) the pygidium of *C. punctatus* under the common designation for all the genera, "*Entomolithus paradoxus.*" These figures appear in his pamphlet, Petrificatet Entomol., etc., copied in the Act. Reg. Acad. Scient. Holmiens, pages 22-24, pl. 1, fig. 2.

In 1763, Lehmann, in the Nov. Comm. Acad. Scient. Imper., vol. x., (table 12, fig. 10) represents a pygidium of the *C. punctatus.*

In 1768, C. F. Wilckens, in Stralsundishes Magazin, vol. iv, p. 267 (table 3, fig. 12) figures a pygidium.

Joh. Beckman, in De Reductione Rerum Fossilium, etc., published in the Nov. Comment, Soc. Reg. Scient. Gœtting, vol. 3, 1773, p. 102, describes a pygidium.

In 1781, M. T. Brunnich, in Nye. Samling af det Kong. Danske Vidensk: Skrifter. Kiobenk., vol. i, p.

394, publishes a description of the then known trilobites. He uses *trilobus*, Walch's designation, in an abbreviated form, and classes the whole family under this name. He was the first author giving specific names to the different species, and calls our present species, *C. punctatus*, from its series of perforated tubercles, *Tribolus punctatus*.

In 1820, Schlotheim (Palæontology in its Present State, Gotha, 8vo., p. 34, No. 3) published a description of five different species, two of which, however, belong to doubtful forms. His No. 3 is designated *Trilobites variolatus.*

Parkinson, in his "Organic Remains of a Former World," on p. 266, vol. iii, gives the following description of the species quoted by Brongniart, for the type of his *Calymene variolaris*: "The representation of a mutilated fragment of which is given plate 17, fig. 16, is a very extraordinary fossil. In this animal, the lobular divisions seem to have very nearly corresponded with those of the Dudley species (*Calymene Blumenbachii*). But the structure of the head part of the animal differs exceedingly from every other species. In this fossil, instead of the appearance of the distinct parts of a face, there are three large round protuberances, the middle being the largest; and all the other protuberances are closely beset with small tubercular risings, * * * the eyes being placed in the centre of each lateral rising."

In 1821, Wahlenburg published, in the Nova Acta Reg. Scient., vol. viii, his Petrificata Telluris Suecanæ. He describes 14 species under the general generic name

of *Entomostracites*, and gives the following description of *E. punctatus*, p. 32, plate 2, fig. 1, (the pygidium only, the head represented and described belongs to *Aci-*

Calymene Blumenbachii, Brong. ' Cauda verrucarum punctatarum serie triplici," and on p. 33, "The shell of the pygidium is longer than it is broad. The axis (back yoke) is furnished along its middle in a longitudinal line with a series of elevated tubercles, perforated at their apex. The lateral folds (pleuræ) also have on each side a very similar series of perforated warts; from this, Brunnich derived the distinctive name of the species."

In 1822, the celebrated Alex. Brongniart published his excellent book upon the Fossil Crustacea. This treatise is the first work which points to the generic differences of the trilobites, exhibiting five genera. On p. 14, he describes *Calymene variolaris*, and refers Parkinson's figure (pl. xvii, fig. 16, vol. iii) to this species. He figures *Calymene variolaris*, on pl. i, fig. 3a, (*Cryp. punctatus*) and fig. 3b (*C. variolaris*). The locality for the fossil represented on pl. i, fig. 3b, is unknown, but he quotes the specimen figured on pl. i, fig. 3a, from Dudley. In his description of the species he says: "We count 12 to 13 rings in the thorax." His fig. 3a, however, shows 12 articulations in the thorax. If this is his 13 ringed specimen, the author has included the occipital ring in his numeration. The *Crypt. variolaris* has 11 thorax segments, and the posterior angles of the cephalic shield are not produced into spines. This, in connection with his fig. 3b, and reference to Parkinson, we think clearly indicates his species, *Calymene variolaris*. The follow-

ing description is evidently of *Crypt. punctatus :* "The glabella seems divided into three hemispherical masses, the middle one being the largest. * * * The sides of the head exhibit at their angles an appendage which is prolonged on the sides of the thorax to the 6th segment (5th). These parts are covered with small grains or tubercles, very numerous and more salient than in the preceding species (*C. Tristani*). They are provided at their summit with a small puncture, like the tubercles of the *Echinoderms* of the genus *Cidaris.*"

Eichwald, in his Obser. Geognostico-Zoologicæ per Ingriam Marisque Baltici, 1825, describes 8 specimens of trilobites, under his generic denomination, *Cryptonymus.* Three of these fossils are now referred as synonyms to *Asaphus expansus* ; and the others to the genus *Illænus,* established by Dalman, in 1826. Eichwald has claimed the priority of the genus *Cryptonymus* over Dalman's genus, but abandons his claim in 1840, and substitutes his generic name, *Cryptonymus,* with the *Calymene punctata,* Dal., as its type for a new genus.

In the year 1826, Dalman published his essay upon the Palæaden, which appeared in the Kongliga Svenska vet. Akademien, 1826, p. 226–293, and the German edition, 1828. On p. 40, No. 6, the *Calymene punctata* is described, and represented on plate 2, fig. 2, as a pygidium, with 10 thorax segments ; and fig. 2 b. represents the same part, with 6 tubercles on the axis, and 7 pleuræ.

In 1830, Eichwald, in his Zoologia Specialis, pars. 2, p. 115, advocates his claim of priority for the genus *Cryptonymus* over Dalman's genus, *Illænus.*

In 1830, Pander published his Beitræge zur Geognosie des Russlands. In his review of the heterogeneous species, which then existed under the genus *Calymene* of Brongniart, he saw the confusion caused by its ill defined limits, and properly sub-divided the genus in proposing the genera *Amphion* and *Zethus;* but not having in his possession the type of the genus, (*Calymene Blumenbachii*) he has added to the confusion in the nomenclature. He thus describes his genus *Zethus:* "Middle body (thorax) as in the genus *Calymene*, (*Phacops* and *Amphion*) side segments of the body and tail provided with strong folds, the latter appearing to be free at their extremities. We count 16 segments of the body and tail together, for we are unable to properly separate them from each other. Cheeks without furrows ; no eye tubercles." Pander refers two species to this genus, the type *Z. uniplicatus* (pl. v, fig. 7,) and *Z. verrucosus* (pl. v, fig. 6, also pl. iv, fig. 4).

Portlock says: "The two species which Pander cites as examples of this genus, do not agree with each other in what must be considered an essential character." The author of the genus *Zethus* remarks, with regard to *Zethus verrucosus*: "We are only in possession of a part, and it may be possible that the fossil belongs to the *Entomostracites punctatus*, Wahl., the *Calymene punctata*, Dalman; but we see from the fragment, more or less disarranged and broken, that the segments and also the head shield were covered with close layers of tubercles, while those of *C. punctatus* appear to be smooth. The furrows of the glabella can be seen, as in *Amphion frontalis* ; eyes wanting. Not having in our possession the

pygidium, we can not say with certainty that this form belongs to *Zethus*." Burmeister refers the *Z. verrucosus* to *C. Tristani;* Buch, to *C. Blumenbachii*, and Doctor Volborth, in the Trans. Royal Mineral So., St. Petersb., 1847, quotes the *Z. uniplicatus*, Pander, under the genus *Cheirurus* and *Z. verrucosus*, Pander, under Loven's genus *Cybele*. Corda takes the same species for the type of his genus *Atractopyge*. Nieszkowski assigns the *Zethus uniplicatus* to the genus *Sphœrexochus*. Portlock (page 289) refers the genus *Zethus* to *Amphion*. It is sufficiently evident that the generic description is very imperfect and ill defined; and also that its type belongs to the genus *Ceraurus*, Green, or to its sub-genus, *Sphœrexochus*; and that all attempts made by authors to class as its type the second species, *Zethus verrucosus*, with Pander's uncertain description, has only propagated an error that leads to great confusion.

In the Petrifactions of the Duchy of Brandenburg, published in 1834, Klœden, p. 106, gives a short description of *Calymene punctata*, without figures.

Buckland, in the Bridgewater Treatises, 1836, on pl. xlvi, fig. 6, represents the *Crypt. punctatus* as *Asaphus tuberculatus*. The specimen was cited from Dudley and from Mr. Johnson's collection. It is evidently the same that Brongniart figured on pl. i, fig. 3a.

In 1839, Murchison in The Silurian System, on plate xxiii, fig. 8, represents the *C. punctata*, and on pl. xiv, fig. 1, the *C. variolaris*. The last figure has 13 segments in the thorax. Fletcher remarks, in his article on the Dudley Trilobites: "A recent inspection of the specimen figured by Sir R. I. Murchison (pl. xiv, fig. 1) from

We may be justified in rejecting *Zethus* of Pander, a name lately revived by Dr. Volborth, for the genus as constituted by Pander, consisting of the following species: *Zethus uniplicatus* and *Z. verrucosus*; to either of which the meagre and incorrect description will apply. The first of these being, by Dr. Volborth's own admission, a species of *Cheirurus*, the second a *Cybele*. He

the cabinet of Mrs. Downing of the Priory near Dudley, enables me to say that it has 11 thorax segments."

Emmrich, in the De Trilobitis Dissertatio, etc., 1839, on p. 20, describes, under *Phacops variolaris*, Park., the *Crypt. punctatus*, as follows: "Head tuberculated; the posterior angles are produced into short horns; glabella convex: the thorax posteriorly diminishes; pygidium pointed."

In 1840, Eichwald, in his Silurian System of Esthland, on p. 71, gave to his former generic name, *Cryptonymus* another signification, and proposed this genus for such typical forms as *Calymene punctata* and *C. variolaris*, in part, with *Cryp. Wœrthii* and *C. parallelus*. In thus abandoning his claims of priority for his genus, *Cryptonymus*, of 1825, over Dalman's genus, *Illœnus*, of 1826, the author substituted for his genus a generic name, which had been used for an entirely different set of fossils, and only pointed out his generic type, without giving a defined description of the genus. To us it appears that he has clearly indicated the group, and given a definite exposition of its essential characters in assigning *Calymene punctata*, Dal., for the type. Eichwald says, in his Die Urwelt Russlands, p. 22: "I found also in Odinsholm fragments of other species, viz: *Calymene variolaris*, Brong., which belongs to the genus *Cryptonymus*. * * * I discovered near Reval an interesting small species of *Cryptonymus*, which has a pygidium similar to *Calymene punctata*, Dalman."

Munster, in his Beit. zur Petrefactenkunde, vol. iii, p. 34, pl. v, fig. 1, describes and figures *Crypt. variolaris*.

In 1843, Burmeister, in his work on the Organization

would restrict the name to the latter; but custom and the opinion of naturalists in general would point in doutful cases like this to the first as the typical species, and we should then have to apply *Zethus* to all we now call *Cheirurus*; more especially as it was only the entire body of *Cheirurus* that Pander knew. (Fide Salter. Decade vii, part ii, p. 9.)

of Trilobites, pointed out the discrepancy between the two figures referred by Bronginart (plate i, fig. 3a-b,) to *Calymene variolaris*, and cited the erroneous 13 segmented *C. variolaris*, Murch., under the genus *Calymene*, and Brongniart's 11 segmented figure under the genus *Phacops*. He also correctly refers the *Calymene variolaris* of Brongniart's pl. i, fig. 3a, under *C. punctatus*.

In 1843, Prof. Hall, in a pamphlet on the Trilobites of the Inferior Strata of New York, describes *Ceraurus* (*Cryptonymus*) *vigilans*.

Emmrich, in Zur Naturgesch. der Trilobiten, 1844, in reclassifying the genus *Calymene*, clearly indicated, though not well described, the divisions of this family in creating the genus *Encrinurus*, with the following generic formula: "*Encrinurus* nov. gen. (der schwanz und *Encrinites*)—Eyes smooth, the glabella inflated, and club-shaped, the pygidium with a many ringed axis and few pleuræ. *Entomostracites punctatus*, Wahl., is so different from all other trilobites, that it is entitled to form a separate genus; it unites the clavate glabella of the *Asaphus*, and has the facial line and eyes like *Calymene*. The facial line is an intermediate between the genera *Calymene* and *Phacops*. On account of its peculiar shaped pygidium, I have given it the above name. In addition to the above named, two of Portlock's species belong to this genus, viz: *Amphion multisegmentatus* and *Ogygia rugosa*."

In 1845, Loven, in the Trans. Swedish Royal Acad. of Science, p. 110, proposed the genus *Cybele* for such types as *Calymene bellatula*, Dalm., and referred to this genus *Caly. verrucosa* and *Caly. velata*. Judging from

the marked character of *Caly. bellatula*, we are of the opinion that Loven's genus should be retained as a sub-genus for the *Cryptonymidæ*.

In 1846, McCoy, in the Synopsis of Silurian Fossils of Ireland, (pl. iv, fig. 15) represents the *Encrinurus Stokesii*. This species is a synonym of *C. punctatus*.

In 1847, Dr. Volborth, in the Verhandl. des Mineral. Gesellsch., zu St. Petersb., (p. 10, pl. i, fig. 1–4) describes and figures *Zethus bellatula*. This species is referred by Eichwald to *Crypt. Wærthii*.

Corda, in Prodrom einer Monographie d.Bohmischen Trilobiten, 1847, on p. 206, pl. v, fig. 52, takes for the type of his genus, *Atractopyge*, the *C. verrucosa*, Dalm. This genus, owing to Pander's imperfect description of *Zethus*, will probably form a sub-genus for the *Cryptonymidæ*.

During the same year the Palæontology of New York, vol. i, appeared with a description of *Ceraurus vigilans*. This fossil is figured on pl. lxv, fig. 2a–g.

In 1848, Salter described the following species in the Memoirs of the Geol. Sur., Great Britain, vol. ii, part 2, viz: *Cybele sexcostata*. (Pl. viii, fig. 10—not fig. 9.)

Kutorga advocates the rightful claim of priority for the genus *Cryptonymus* over *Encrinurus*, and recommends the adoption of Eichwald's genus instead of *Encrinurus*. (Trans. Royal Mineral Soc., of St. Petersburg, 1848.)

In 1849, Dr. Volborth, in the Bull. de la Soc. des Nat., de Moscow, published an article on the genera *Zethus* and *Cryptonymus*.

In the Quarterly Geological Journ., vol. vi, pl. xxxii,

Fletcher published an essay on the Dudley Trilobites, in which he points out the obvious discrepancies which heretofore existed in regard to the identification of the species *Cybele punctatus* and *C. variolaris.*

In 1851, McCoy, in the Palæozoic Fossils of the Woodward Museum, on p. 156-8, mentions the following species: *Encrinurus Stokesii*, *Zethus sexcostatus.*and *Z. variolaris.*

Angelin's Palæontol. Scandinavica appeared in 1852, with the generic formula of *Cryptonymus.* This author also describes the following species: *Crypt. punctatus*, syn. *Encrinurus variolaris*, et *Stokesii;* and in addition, the *Crypt. bellatulus*, *C. obtusus*, *C. lævis*, *C. caudatus*, and *Crypt. verrucosus.*

In the Memoirs of the Geol. Sur., United Kingdom, Decade vii, on plate iv, fig. 1–16, Salter describes and figures *Encrinurus sexcostatus*, *E. punctatus* and *E. variolaris*, and remarks: "If the strict rule of priority were observed, irrespective of clear definition, we should be compelled to adopt the name *Cryptonymus* for this genus, as that of *Zethus* for *Cybele.* Doctor Kutorga, indeed, in the Tran. of the Royal Mineralogical Society, St. Petersburg, 1848, advocates this course, and has restored the name *Cryptonymus*, under which Eichwald at first described several varieties of the common *Asaphi* of the Russian Silurian rocks. Subsequently, (1840) aware of his error, he restricted *Cryptonymus* to such trilobites as the *Calymene variolaris*, Brong., including the *Calymene punctata*, and some forms of *Cybele.* But, though thus marking out the group he intended, he gave no description of the amended genus; besides which,

he is now applying the name to a totally different set of fossils to those for which it was originally intended. Under such circumstances, it is impossible to retain his name in opposition to the genus clearly indicated, though not sufficiently described, in Emmrich's scientific arrangement of 1845."

Eichwald's essay on the genera *Cryptonymus* and *Zethus*, published in 1855, says: "Soon after my journey from Wilna to St. Petersburg, I had the opportunity to renew my observations in the neighborhood of Zarskoje-Selo and Pawlowsk, and shortly afterwards, on several different occasions, in Esthland. My collection of trilobites consisted not only of the species which I had described, but also of many new forms. I referred the species, which had hitherto been classed under my genus *Cryptonymus*, to *Illœnus*, for this genus had meet with universal acceptance, to the detriment of my *Cryptonymus*. In the year 1840, I gave to *Cryptonymus* a new signification, and referred the *Calymene punctata*, Dalm., and *C. variolaris*, Brong., in part, and added two new species, *Crypt. Wœrthii* and *C. parallelus*, to it. In taking the well known *Calymene punctata*, Dalm., as the typical form for the genus, we gave a short description, reserving the exact diagnosis for the Palæontology of Russia. It is evident to every person who will decide impartially and generously with regard to the new limitation of the genus *Cryptonymus*, to easily perceive its characters from the given type. The learned Angelin, in his Monograph of Swedish Trilobites, not only recognized my genus, but also gave the generic formula.

"The following are the reasons which I previously held and still advocate: First—to mantain *Cryptonymus* as a genus for several Russian and Swedish trilobites, according to Angelin's diagnosis, which was derived from my short, but distinct, description given in my work on the Silurian System of Esthland.

"Second—To acknowledge the *Zethus*, Pander, only as a genus for the *Z. uniplicatus*. This is the typical species given by its author: we have no authority to take this species, which differs from all other trilobites, and class it under *Zethus verrucosus*, which was doubtfully referred to this genus by Pander, and by this combination establish an independent genus.

"Third—The *Zethus verrucosus*, Pand., is probably the *Crypt. verrucosus* of Angelin; not *Crypt. parallelus*, Eichw., or *Cybele bellatula*, Loven. The *Z. bellatulus*, Volb., is a synonym of *Crypt. Wœrthii*, and not of *Cal. punctata*, Dalm., or *variolaris*, Brongniart."

Doctor Volborth advocates the priority of the genus *Zethus* over that of *Cryptonymus*, in an article published in the Bull. de l'Acad. des Scien., de St. Petersburg, vol. xiii, No. 19, 1855.

Dr. Shumard describes, in the Geological Survey of Missouri, 1855, p. 198, pl. b, fig. 10, *Encrinurus deltoideus*.

In 1857, Nieszkowski, in his Monograph of the Trilobites found in the Silurian System of the Baltic Provinces, on p. 72-103, describes the genera *Encrinurus* and *Zethus*. This author correctly figures and describes the facial angle of *Encrin. punctatus*, and the following species: *E. punctatus*, pl. iii, fig. 6-7; *E. multiseg-*

mentatus; E. sexcostatus; Zethus bellatulus, with the following synonyms: *Crypt. punctatus, variolaris*, and *Wœrthii*, Eich., also *Z. bellatulus*, Volb. He describes *Zethus rex*, pl. i, fig. 3; *Z. atractopyge*, McCoy, and *Z. brevicauda*, Ang.

In 1858, Schmidt, in an article on the Silurian System of Esthlands, describes *Encrinurus punctatus*.

Doctor Volborth, in the Memoirs de l'Acad. imp. d. Sciences, de St. Petersburg, vol. vi, No. 2, p. 20, 1863, remarks: "Eichwald abandoned his original genus, *Cryptonymus*, about twenty years ago, and transferred the generic name to other trilobites. He cannot forget this fact, that the genus *Cryptonymus* of 1825 has priority over *Illœnus*, which was established in 1826; and he refers on every occasion to it, even in his Lethæa Rossica, on p. 1476. In his pamphlet on the genera *Zethus* and *Cryptonymus*, he endeavors to prove his opinion by taking the absolute majority, remarking: 'That of the eight published species of *Cryptonymus*, five, the majority, belong to the genus *Illœnus*, and only three to *Asaphus*'; the author therefore claims the priority for his genus over *Illœnus*, which was published two years afterwards. The majority cannot decide this question, but only the total number. The author would have the right to claim his generic priority, if each of the 8 species of *Cryptonymus* had the ten segments of the genus *Illœnus*. Suppose it could be possible to give to two different forms the same characteristics, (which is an impossibility) and we take Eichwald's given numbers, we must give three species to the genus *Asaphus*, and five to that of *Illœnus*. Now, *Cryptonymus*, which represents

both, would be equal to 3 plus 5, which is 8. Now, if we take away the *Asaphus*, or the number 3, the *Illænus*, or 5 remains. This number cannot alone establish the genus *Cryptonymus*. * * * * * * * * * * The new genus *Cryptonymus*, established from the former name, meets with the same objection that the older genus had: for it was established upon two altogether different genera, viz: *Zethus* and *Encrinurus*. The former calculation reappears with the same consequence; the younger genus *Illænus* having replaced that of *Cryptonymus* of 1825, so also will the *Encrinurus* of 1844 be substituted for the *Cryptonymus* of 1840."

In 1865, Billings, in his work on the Palæozoic Fossils of Canada, vol. i, describes *Encrinurus mirus*, on p. 292, fig. 282.

In the Catalogue of Silurian Fossils of Antic., Anticosti, which was published in 1866, the *Encrinurus elegantulus*, Billings, is described.

In 1867, Prof. Hall described *Encrinurus nereus*, in the 20th Regents' Report, N. Y. State Cabinet, p. 375.

In 1874, Steinhart described and represented *Encrin. punctatus*, in the Beit. zur Natur., Preussens, on p. 57, Tab. iv, fig. 15.

In 1875, Hall and Whitfield (Geol. of Ohio, vol. ii, part 2,) describe *Encrinurus ornatus*.

In 1877, Walcott described the following species: *Encrinurus varicostatus* and *E. Trentonensis*, in a pamphlet published in advance of the 29th Regents' Report of the New York State Cabinet.

Miller, in his Catalogue of American Palæozoic Fossils, part Crustacea, gives a list of the North American Trilobites.

CRYPTONYMUS—EICHWALD. 1840.

SILURIAN SYSTEM OF ESTHLANDS, P. 71.

"*Corpus* obovatum, convexum, longitudinaliter trilobum, crusta lævissima vel granulata.

Caput semilunare, cornigerum 1. muticum: margine incrassato, sulcoque intramarginali: segmentum oculiferum distinctum: sutura facialis postice ab oculo extrorsum ad marginem lateralem decurrens, antice prominentiam frontalem arcte circumscribens. Oculi parvi, subglobosi, minute reticulati pedicellisque immobilibus suffulti. Frons antrorsum dilatata, limbum attingens.

Thorax segmentis circiter 11 angustis, sulco longitudinali destitutis, apicem versus retroflexis.

Abdomen capite multo augustius, immarginatum: latera utrinque costis distinctis, marginem superantibus: rachis conica, crebre transversim striata."*

Sub-genus I. CRYPTONYMUS, *Eichwald*, 1840.

The cephalic shield is semi-circular, or parabolic, with the posterior angles extended into spines, (*Cryptonymus punctatus*) or obtusely rounded (*Cryptonym. orbicularis*). Glabella inflated and clavate, with three indistinct lateral lobes, and a large forehead lobe: eyes pedunculate, finely facetted. The facial sutures commence a little above the posterior angles of the head, and run directly to the eyes; bending at this point, they curve to the front, and running anterior to the glabella, they turn suddenly

* Angelin's Palæontol. Scandinavica, page 2.

at an angle of nearly 90° downwards, and then parallel with each other, in a vertical direction they cut the marginal edge; the lines at this point converge and combine into a rostral suture. (Nieszk.) The cheeks are separated in front by the vertical suture. Thorax with 11 equal segments, without pleural grooves, notched at the ends, but not produced into spines. Pygidium with the ends of the pleuræ free; axis with many rings. The axis is perfectly ringed in *Cryptonymus multisegmentatus;* notched on both sides in *Crypt. variolaris.* The type for this sub-genus is *Crypt. punctatus.* Dal.

Sub-genus II. Cybele, *Loven,* 1845.

Cephalic shield semiluna, with broad and rounded posterior angles; glabella with three furrows, the anterior lobe clavate. The posterior branches of the facial line commence some distance above the posterior angles of the head, and run obliquely to the cone shaped eyes, which are well advanced on the cheeks, nearly opposite the third glabella furrow. Anterior branches of the facial line run from the eyes, and then converging to the front of the glabella, to the outer margin, they are then combined into a short rostral suture. Cheeks convex, deflected before the eyes and covered with large tubercles. The thorax consists of 12 segments, 6th to 12th run parallel with the five anterior segments to the fulcrum point; at this place they bend posteriorly at an angle of 90°, and terminate in long pointed spines, particularly the 6th segment, according to Angelin's figures represented on pl. iv, fig. 1. The five anterior thorax segments are altogether of a different character the pleuræ being facetted at their extremities.

Loven, on pl. ii, fig. 3a-c, represents three copies of *C. bellatulus*; fig. 3a has the first three thorax segments facetted, and fig. 3c, the first to fourth. From these figures we would judge that the first 5 thorax segments had distinct fulcral points, which consisted of an attached articulated extremity. The pygidium is triangular and has a conical axis, which consists of 16 to 18 notches; only the first 4 or 5 axis joints have pleuræ. The type for this sub-genus is *Cybele bellatulus*, Dalm.

Sub-genus III. ATRACTOPYGÆ, *Corda*, 1847.

Cephalic shield semiluna, with the posterior angles almost produced into short spines. Glabella clavate, with a wide anterior lobe; the eyes are situated in the centre of the cheeks; if an imaginary circle be drawn, with its central point in the middle of the occipital ring, and if ½ its diameter be equal to the length of the glabella, on the median line, it will cut the eyes at their base. The posterior branches of the facial sutures commence on the outer margin, near the lateral posterior angles of the cheeks. The thorax has 11 segments; the pleuræ are posteriorly bent, and have pointed extremities, with a central row of tubercles. The pygidium has a double row of tubercles on each side of the axis and four pleuræ; the first, second and third are twice the width of the axis joints; fourth is three times the width. The type for this sub-genus is *Calymene verrucosa*, Dalm.

Loven's copy of this species, figured on pl. i, fig. 5f, does not represent the dorsal furrows, which divide the axis from the segments; therefore, Corda, who copies this figure for the type of his genus, remarks: "the py-

gidium consists of only the axis." (Vide p. 206, plate v, fig. 52, Prod. einer Monographie der Bohmischen Trilobiten.)

Cryptonymus punctatus, *Wahl.* 1821.

Plate I, Fig. 1–6 and 17. Plate III. Fig. I5–I6.

General form ovate; length nearly twice the width; cephalic shield and pygidium about equal, excluding the terminal mucro. Thorax nearly half the entire length. Cephalic shield semi-circular, gibbous in front; its posterior angles are produced into extended spines; its length equals about half its width; the surface is coarsely granulated with large tubercles, each with a minute perforation or puncture. (Pl. i, fig. 9b.)

The cephalic shield is bounded by a wide, thick edge margin, which is narrow at the glabella, and covered with two rows of tubercles—(Nieszk.) Glabella clavate and gibbous, overhanging the slight anterior margin, nearly spherical in front, where it has a distinct border of large tubercles, (pl. i, fig. 1,) and narrowing anteriorly to half its front width, its base being less than one-third of the entire width of the head; two or three tubercles are arranged on each side of the lower half of the glabella, occupying the situation of the lateral lobes, the furrows between which are not visible; the dorsal furrows are deep, the cervical furrow curving outwards to the front; the cheeks are separated with deep sulcations from the margin of the head.

The posterior branches of the facial sutures commence on the exterior edge of the cephalic shield, just above the posterior angles, and run in an oblique direc-

tion to the large pedunculated eyes, over their base, which are nearly in the middle of the cheeks; the anterior branches of the facial sutures converge from the base of the eyes to the front of the glabella; they then turn suddenly at an angle of 90° downwards, and running parallel in a vertical direction to the marginal edge, which they cut, and then converging, combine into a rostral suture. (Pl. i, fig. 17.)

A flattened space, bordered by a row of tubercles, surrounds the base of the eyes; the distance of the eyes from each other exceeds the extreme width of the glabella, and are finely facetted, according to Kutorga. The cheeks are triangular; and separated in front by a vertical suture, convex and tumid. The occipital furrow is continuous; and the occipital ring broadest in the centre, which is smooth, but has a tubercle at each extremity. Hypostoma ovate, rhomboidal, subtrilobed tubercular and surrounded by a sinuated margin; its convex extremity very broad, and its cucullated tip buts against a large tubercle, placed upon the anterior margin of the head; (pl. i, fig. 1a,) the wings or apophysis of the hypostoma are short and triangularly pointed.

The thorax has 11 segments; the slightly convex axis is distinctly bounded by dorsal furrows. The axis joints are somewhat narrower than the pleuræ, and wider on the median line than at their lateral extremities; 7th and 9th axis joints (7th and 10th, according to Salter and Barrande) have on their median line a small spine.

The pleuræ are without grooves, notched at their ends, and usually covered with small tubercles, the pleuræ are horizontal half way down, then strongly curved

downward, and at their fulcral points they are slightly bent backwards. The pygidium is long and acutely triangular, terminating in an extended mucro; its axis tapering posteriorly to its acute termination, which has from 28 to 30 distinct side notches, the centre is smooth and has 7 prominent tubercles, 4 articulations intervening between two tubercles; 8 pleuræ on each side of the axis, gradually decrease in size as they approach the termination of the pygidium; the anterior pleuræ curve backward, and they are separated by deep furrows, and a distinct tubercle is placed upon the upper and inner part of each pleuræ, near the dorsal furrows.

According to Nieszkowski, between the 1st, 2nd and 3rd tubercles of the axis of the pygidium, 2 notches appear; between the 3rd and 4th, 4 notches; between the 4th and 5th, 4 to 5 notches appear, and between the 5th and 6th, 5 to 6 notches.

Wahlenburg represents on pl. ii, fig. 1, a pygidium with 7 tubercles and 28 notches on the axis, and 8 segments; Angelin's copy of the same, figured on pl. iv. fig. 4, has 8 tubercles and 26 notches on the axis, with 8 pleuræ. Both these specimens are from Gothland. Dalman's representations of the pygidium on pl. ii, fig. 2a and 2b, have 5 and 6 tuburcles on the axis, and 7 pleuræ; Corda, on pl. v, fig. 55, represents a copy with 6 tubercles and 22 notches on the axis, and 7 pleuræ: Nieszkowski figures a specimen from Oesel, with 6 to 7 tubercles and 25 to 28 notches on the axis, with 8 pleuræ.

Geological localities—Upper Silurian: Dudley, Gottland, etc.

Lower Silurian: Bala Rocks, Pwllheli, Carnarvonshire.

CRYPTONYMUS VARIOLARIS. *Brong.*, 1822.
PLATE I, FIG. 6–10. PLATE III, FIG. 13–14.

The general form is obtusely ovate. Cephalic shield obtuse, and not produced into spines; the posterior angles are ornamented with a cluster of tubercles, which occasionally terminate into a single tubercle. The glabella is inflated and covered with large tubercles, equally disposed. The thorax consists of 11 segments. The pygidium is convex and triangular, its length and breadth about equal; and its axis has 9 to 10 rings, much narrower than its lateral portions, and gradually diminishing into a blunt apex; the 7 pleuræ are broad and abruptly bent downwards and backwards.

The posterior pleuræ are rounded off at their extremities and extended below the blunted axis. Each pleuræ has a tubercle near the axis. The upper ring of the axis has usually a single large tubercle upon its centre, the 2nd has a central puncture or slight depression between 2 large tubercles; the remaining rings have alternately a tubercle and a puncture between 2 tubercles, except the 3 posterior rings, which have each a single tubercle only. Variations: the front of the glabella is more gibbous in some specimens than in others, and the marking of the pygidium is not constant.

Localities: Wenlock Limestone, Dudley, etc.

CRYPTONYMUS DELTOIDEUS. *Shumard*, 1855.
GEOLOGICAL SURVEY OF MISSOURI, P. 198, PL. B, FIG. 10.

Pygidium subtriangular, width greater than the length, moderately convex, arched before, posterior extremity rounded and bent slightly upwards. The axis

tapers to a point at some distance within the blunt apex; it is convex at its broadest end, and becomes flattened and slightly elevated above the pleuræ; the dorsal furrows are well defined. Axis with about 24 narrow rings, only the first 4 or 5 are entire, the others are notched at the sides, leaving the centre free, which has several very small granules. The 7 pleuræ are narrow at their base, and become wider at their extremities; they curve downwards and backwards, the last 2 or 3 pleuræ being almost parallel with a line drawn through the length of the axis. The surface is minutely granular. The length of the largest specimen is 9 lines, with a width of 10½ lines.

Locality: Cape Girardeau Limestone, 2 miles above Cape Girardeau, Missouri.

The only difference between this species and Salter's *Encrinurus sexcostatus* is the addition of one pleuræ, giving Shumard's species a more pointed form.

CRYPTONYMUS LÆVIS. *Angelin*, 1852.

PALÆONTOLOGIA SCANDINAVICA, PL. IV, FIG. 10.
PLATE II, FIG. 10.

"*Cryptonymus* fronte subintegra, abdomine lævissimo, triangulari, acuminato, costis utrinque 8.

Regionis E, Gottlandiæ, ex gr. ad Hugklint prop Wisby."

CRYPTONYMUS OBTUSUS. *Angelin*, 1852.

PALÆONTOLOGIA SCANDINAVICA, PL. IV, FIG. 9.

"*Crypt.* abdomine obtuso: rachi obsoletius granulata: lateribus lævissimis, costis utrinque 10.

Regionis E, Gottlandiæ, ad Katthammarsvik."

CRYPTONYMUS ORNATUS. *H. and W.*, 1875.

SYN. CYBELE PUNCTATA, HALL, PAL. N. Y., VOL. II, P. 297.
ENCRINURUS ORNATUS. HALL, GEOL. OHIO, VOL. II, P. 154.

The cephalic shield is semilunar or subcrescentiform, with the posterior angles extended into long spines. Gabella clavate, not lobed; surface of the glabella and cheeks tuberculated. Thorax composed of 11 segments. Pygidium triangular; as wide, or a little wider than long. The axis forms less than $\frac{1}{3}$ of the entire width, is strongly marked and somewhat flattened on the top, except at the anterior portion; it has about 20 or more segments; the centre is marked with a row of five prominent tubercles, the anterior one of which is situated on the 2nd ring, the next on the 5th; the others have 3 rings between each tubercle. Seven well defined pleuræ exist in the Ohio specimen, and they are all directed backwards, gradually decreasing in size; each pleuræ appears to have been marked near the dorsal furrows with a node, and also with two or more other nodes further out on the pleuræ.

A specimen of a pygidium represented on pl. lxvi, fig. 1g, Pal. N. Y., vol. ii, shows a row of four tubercles on the centre of each pleuræ.

Steinhart figures in his work on the Trilobites of Prussia, pl. iv, fig. 15, a triangular pygidium of *Crypt. punctatus* with 20 axal notches and 5 nodes. This specimen has 7 pleuræ, and also latteral tubercles; each pleuræ being marked at its base with a prominent tubercle. We know of no species belonging to this section which has a central row of tubercles along the pleuræ

of the pygidium. In the *Atractopygidæ* the pleuræ of the pygidium of *A. verrucosus*, have from 4 to 6 nodes running down the centre of each pleuræ, but the axis is marked with 4 lateral rows of tubercles.

Niagara Group: Eaton and Yellow Springs, Ohio; Medina, Orleans County, and Reynale's Basin, Niagara, New York.

Cryptonymus Nereus. *Hall*, 1867.

Encrinurus Nereus. Hall, 20th. Reg. Rep. N. Y. Cab. P. 375.

"Pygidium triangular; length and breadth about equal. Axis sharply elevated and marked by about 18 rings, (well defined and extending across the axis) with a further extension upon which no markings are distinguishable. The latteral lobes are marked with 8 or 9 pleuræ, which in the cast are not tuberculated."

Formation and locality: Niagara Group; Racine, Wis.

The *Encrinurus Trentonensis*, Wal., may be a synonym of this species, although Walcott's species has an axis, in which the first anterior ring is marked with a node on its centre, then in order the 3, 4, 10, 18 and 22 rings; which gives these forms certain affinities with the *Encrinurus multisegmentatus*, of which Nieszkowski says: "The axis has not the smooth central space common in all other species of *Encrinurus* and generally covered with tubercles; very small nodes can be seen, with a lens, on perfect specimens along the centre of the axis of the pygidium. The number of pleuræ is generally nine, seldom ten."

CRYPTONYMUS CAUDATUS. *Ang.*, 1852.

PALÆONTOLOGIA SCANDINAVIA, P. 88, PL. IV, FIG. 2.

"Pygidium triangular with a mucronated tail, smooth, with 5 or 6 pleuræ on each side.

Locality: Regions D. and E., Norway, Brevig."

CRYPTONYMUS STRIETUS. *Ang.*, 1852.

PALÆONTOL. SCANDINAVIA, P. 80, PL. IV, FIG. 13.

"Pygidium smooth and pointed; pleuræ ten; axis with about seventeen notches, which are obliterated in the centre.

Locality: Regions D. and E., Dalecarlia."

CRYPTONYMUS SEXCOSTATUS. *Salter*, 1848.

"Length about an inch and a half, breadth an inch. General form broad-ovate; the head and tail convex, the body rather flat. Head about equal in length to the tail, but shorter than the thorax; its shape triangular, the lateral angles produced, the front rounded gibbous, and overhanging. The glabella occupies full one third of the width of the head in front, where it is much inflated and more than hemispherical; it overhangs the margin, which, as is usual in the genus, is not distinctly separated from it in front, but within the margin and above it on the glabella, there is a strong furrow which runs quite across the glabella, separating from it a thick prominent ridge (fig. 3, a) so completely that it appears not to form a part of the glabella, but to belong to the thickened front margin.* The entire glabella is pyriform, constricted behind to half its width, and separated

* This singular furrow is probably the place of the facial suture.

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" 25 " 2, for PL. IV, FIG. 2, read PL. XLI, FIG. 11.
" " " 6, " STRIETUS, read STRIATUS.
" " " 7, " P. 80, PL. IV, read P. 89, PL. XLI.

by a strong sulcus from the neck segment, which is broad and prominent. It is indented half-way up by three short furrows on each side. The cheeks, though convex, are much less so than the glabella, and they bear the eyes in the middle of the cheek. * * The outer margin of the cheek is thick, and separated by a furrow, and the posterior angles are produced into spines; the posterior edge also has the strong neck furrow continued along it. The glabella is covered with tubercles of unequal size, mixed with granules, but the specimen does not show whether these tubercles have each a pit on their summit. * * The thorax consists of 11 segments; the axis moderately convex, of nearly equal breadth throughout, and considerably narrower than the pleuræ. These are quite horizontal as far as the fulcrum, which is placed more than half-way from the axis; and from this point they curve backward and downward to the tip, which is again a little bent forward, so that the line from the fulcrum outwards is a sigmoid curve; the hinder pleuræ curve less backward. Each pleuræ is nearly semicylindrical, with three or four tubercles along it. * *

Tail of a triangular form, wider by one third than the length, with an obtuse rounded apex, and flattened above, the sides and the tip deflected, so that the tail is moderately convex; the axis at the upper part is about one fourth the width of the tail, and tapers to a point at some little distance within the blunt apex; it is convex at its broadest end, and there the rings are continuous across, but from about the upper third it becomes flatter, and the rings are effaced along the middle; its

apex is quite flat. There are about 20 rings in all, and no tubercles down the smooth central portion. The sides of the tail have 6 strong ribs, which are broad and somewhat flattened, divided from each other by narrow deep furrows, and have the tips squarish and obtuse. The ends of the four upper ones are free (or rather much overhanging the margin); the remaining two are distinct nearly as far as to the margin, but they become fused with those from the opposite side, and extend in a very blunt point beyond the tip of the axis. The uppermost ribs arch strongly outward, the next less so, and the last pair lie parallel to the axis. Externally the whole surface of the tail is covered with a close scabrosity (figure 10).

Variations—In the cast from Sholes Hook (fig. 12) the rings on the axis of the tail are effaced down the middle for a broader space, and there are but few of the upper rings continuous across. Our figure in this case does not show the uppermost rings. There are sometimes (fig. 11) seven rings on each side of the tail."

Localities and Geological Range: Llandeilo Flags: Rhiwlas and Llwyn-y-ci, north west of Bala Lake, etc.*

CRYPTONYMUS RARICOSTATUS. *Walcott*, 1877.

PUBLISHED IN A PAMPHLET ISSUED IN ADVANCE OF THE 29TH REGENTS' REPORT, N. Y. CABINET, P. 16.

"Pygidium subtriangular, convex; length and breadth about equal; anterior lateral angles truncated, so that the lateral margins commence opposite the centre of the pygidium. Axial lobe not very prominent; crossed by

* Copied from The Mem. Geol. Survey of the United Kingdom. Decade vii.

about 16 smooth rings—the anchylosing of the posterior rings renders it difficult to determine the exact number. The lateral lobes are marked by 6 broad, pleuræ—the posterior pair unite back of the posterior termination of the axial lobe.

Formation and Locality. Trenton Limestone, Mineral Point, Beloit and north of Janesville, Wisconsin."

Compare *Crypt. sexcostatus* and *Crypt. deltoideus.*

Cryptonymus Trentonensis. *Walcott*, 1877.

Description of New Species of Fossils, from the Chazy and Trenton Limestone, P. 16.

"Pygidium triangular, convex; length and breadth about equal; axial lobe rounding, tapering toward and terminating within the posterior margin; marked by 23 rings, beyond which there are several, too indistinct to be counted; the first anterior ring has a node at its centre; then, in order, the 3, 6, 10, 14, 18 and 22 have a similar node at the centre. Lateral lobes slope rapidly to the margin; each has 9 elevated costæ running obliquely backward to the margin.

Formation and Locality. Clifton, Grant county, Wis., and two miles above Dunlith, Ill., north of State Line monument."

This species has certain affinities with *Cryptonymus Nereus*, Hall, and it may be identical; although the axis represented in the copy of the cast figured in the 20th Regents' Report, N. Y. State Cabinet, does not show the tubercles along its centre.

CRYPTONYMUS VIGILANS. *Hall*, 1847.

PLATE II, FIG. 1 A–H.

The cephalic shield is more than semiluna in form, with its posterior angles produced into long sharp spines, which, when perfect, extend to the pygidium; their extremities curve upwards. The glabella is not lobed; the front margin (limbus) is thickened, and marked by two lines of nodes; the eyes are facetted, sub-conical and remarkably prominent.

The surface of the head is marked by large tubercles; each node has a minute perforation or puncture at its apex. The small hypostoma is ovate and attached to the glabella. The thorax consists of 11 segments; the pleuræ are extended and three times the width of the axis joints; the axis of the thorax has on every second joint a node or short spine.

The pygidium is triangular and consists of 9 pleuræ, every alternate one being ornamented with a node: the axis has about 18 rings, every third one being marked by a tubercle.

Locality: Trenton Limestone; Middleville, N. Y.

CRYPTONYMUS MULTISEGMENTATUS. *Portlock*, 1843.

Cephalic shield, with prolonged posterior angles: glabella convex, clavate, being in front twice as wide as at the base; the surface is covered with large convex and pointed nodes; the cheeks are separated from the glabella by deep dorsal furrows, and are also covered with nodes. The pygidium is triangular, with a conical axis, consisting of many rings, about 32 or 33; but they are not

clearly defined. Small tubercles can be seen on the axis of the pygidium, along its centre. The number of pleuræ is generally nine, very seldom ten. (Nieszk.)

The original description of this species is as follows: "Axial segments very narrow and numerous, 28 being enumerated as far as the last side segments, and still continuing, though very minute, to the very apex. A small lozenge shaped caudal plate. Side segments 12 on each side, exclusive of the false segment. They are rounded, and slighty bent or raised at their extremities; no punctures or marks of any kind." Salter's description of the pygidium gives 30 axis rings and 12 pleuræ.

We would suggest that the species described by Nieszkowski, be cited as a variety under the name of *Crypt. Nieszkowskii.*

Lower Silurian: Tyrone, Montgomeryshire, Ireland; Neuenhof, near Hapsal, Russia, etc.

CRYPTONYMUS (CYBELE) REX. *Nieszkowski*, 1857.

The cephalic shield is semilunar. The glabella is clavate in form, prominently convex in the middle, and has on each of its slopes three deep oval notches; its surface is marked by four pair of smooth tubercles, placed in two lines and converging posteriorly towards each other. The marginal border (limbus) has in front of the glabella five short equi-distant spines, giving to the glabella a crown; this border is wide and thick, and its surface is covered proportionally with large round tubercles, placed in irregular lines. The course of the facial suture is the same as it is in the other species of this group, and has a row of small nodes on each

side of the line. The cheeks are as much arched as the glabella, and they appear from impressions left by casts to be deeply striated. On the anterior portion of the cheeks, at their greatest convexity, the elevated pedunculated eyes are located; they are small, and club shaped.

The cervical and occipital furrows are deep and wide. The occipital ring is marked by four tubercles.

Locality: Wesenberg, Wannamois, Odinsholm, Rus.

CRYPTONYMUS (CYBELE) BELLATULUS. *Dalman*, 1828.

PLATE II, FIG. 1.

The general form of the cephalic shield is semilunar, its width is twice its length; the marginal border (limbus) is wide and thick, the posterior angles being short and obtuse. The moderately convex glabella is marked with three furrows, which do not extend across it; from the base of the glabella to the first furrow its form is nearly cylindrical, and from this furrow towards the front it is clavate. The prominently arched cheeks are separated from the glabella by deep and wide dorsal furrows; the eyes are small and pedunculated, inclining to the front. The surface of the head is covered with large tubercles.

The facial sutures commence on the outer margin, some little distance above the posterior angles, and run obliquely to the eyes; they then converge towards the front of the glabella, and afterwards to the outer margin. The occipital ring is greatly convex.

The thorax consists of 12 segments, and has marked

characters; the first to six pleuræ are nearly cylindrical, smooth, and terminating with rounded extremities, which incline towards the front.*

The sixth pleuræ is about twice the thickness of the others; it gently slopes posteriorly until it reaches the fulcrum point, where it is suddenly bent at an angle of 90° to the rear, and runs parallel with the axis, terminating in a long pointed spine; the other segments conform with this one, and gradually diminish in size as they approach the posterior extremity of the animal. The pygidium consists of four pleuræ: the axis is pointed, and marked with 16 notches, which do not extend across it; the first four notches only have pleuræ. The pleuræ as they approach their ends run almost parallel with a line drawn through the centre of the axis; the last pair are united at their extremities. Length one and one-half inch.

Locality: Wesenburg, Wannamois, Russia.

CRYPTONYMUS (CYBELE) ATRACTOPYGE. *McCoy*, 1851.

The pygidium is obtusely triangular; the axis, which becomes narrower, consists of about 16 rings, only the first four extending across it, and have pleuræ; the others are notched on the sides: its surface is marked with two lateral rows of convex tubercles (7 on each side); the last pair are in the middle of the axis.

*NOTE—Angelin figures a copy with an attached process to the second segment; and future observation may develop the fact that the five anterior pleuræ have distinct fulcrum points at their rounded extremities, with a separate articulated attachment. Should this be so, all the pleuræ would conform to the sixth.

CRYPTONYMUS (CYBELE) BREVICAUDA. *Ang.*, 1854.

PAL. SCAND., PLATE XLI, FIG. 14.

The axis of the pygidium consists of 13 articulations; the first four have perfect rings with pleuræ, the others are notched at the sides without pleuræ; along its lateral portions the axis is marked by 2 parallel rows of nodes.

The pleuræ are directed backward, being almost parallel with a line drawn through the centre of the axis; their surface is smooth.

Locality: Regions D. and E., Dalecarliæ, Sweden; Neuenof, near Hapsal, Russia.

CRYPTONYMUS (CYBELE) DENTATA. *Esmark*, 1832.

TRILOBITES DENTATA. ESMARK, MAG. FOR NATURVIDENSK., VOL. I, P. 269. PL. VII, FIG. 10.

TRIL. DENTATUS, AND T. PLICATUS. L. C. PAGES 139 AND 140.

Pygidium smooth?—axis transversely striated, with about 17 segments: they are obliterated in the middle of the axis.

Locality: Regions D. and E., Christiana, Norway.

CRYPTONYMUS (CYBELE) WŒRTHII. *Eichwald*, 1840.

SYN. ZETHUS BELLATULUS. VOLBORTH, 1847. VERHANDL. DES MINERAL. GESELLSCH. ZU ST PETERSBURG, P. 10, PL. I, FIGURES 1–4

CRYPTONYMUS WŒRTHII. EICHWALD, LETHÆA ROSSICA, P. 14-16, PL. LIV, FIG. 17, 1860.

Cephalic shield convex. The eyes are placed nearer to the posterior margin than to the anterior margin. The *C. bellatulus* has directly opposite characters. The eye pedicles of this species are placed more to the

front, on both sides of the front lobe of the glabella; the facial line, therefore, runs obliquely to the front, from the posterior angles of the head; this line in *C. Wœrthii* terminates nearly parallel with the posterior margin of the cephalic shield; the eye pedicles on the high arched cheeks are placed alongside of the middle furrow, and not, as is in *C. bellatulus*, on the side of the large anterior front lobe of the glabella.

The three glabella furrows are indistinctly marked. Thorax has 12 segments. The sixth segment of the thorax in *C. bellatulus* extends itself, as Angelin shows it in his plate, and terminates in a very long sharp point. This character is not noted in *C. Wœrthii*.

The four segments of the pygidium are wider than long. Length generally about one inch.

Locality: Pawlowsk, (Fide Eichwald, *Zethus* and *Cryptonymus*, pages 13, 19 and 20.)

CRYPTONYMUS (ATRACTOPYGÆ) MIRUS. *Billings*, 1865.

Cephalic shield semi-elliptical; width more than twice the length. Glabella clavate, moderately convex; the anterior dorsal furrows are irregularly rounded, with a notch in the middle. Occipital margin half the width of the limbus; cervical furrow extending across. The three glabella furrows on each side extend one-third across; the lobes gradually diminishing in size posteriorly. Fixed cheeks broad, gently convex. Eyes distinct; located about the width of the glabella from the dorsal furrows, opposite the second lobe, and placed about opposite the last glabella furrow. They appear to be small, and are connected with the front furrow by an ocular ridge. Movable cheeks unknown.

Pygidium with an elongated conical, convex axis, with from 12 to 14 distinctly defined articulations, with four narrow pleuræ, gradually diminishing in size and bent backwards; the last pair commencing at about the mid-length of the axis, and extending posteriorly parallel and close to the axis. The next also nearly parallel, and the anterior, two pair, with the posterior half of their length parallel or converging. Between each two principal ribs there is a smaller one, slightly elevated, and seems to become obsolete before reaching the fulcrum. The pleuræ are at this point bent to the rear at an angle of 90°, and terminating in short spines.

Surface of the glabella with a few small tubercles; cheeks coarsely punctate; pygidium with three or four tubercles on the principal pleuræ.

Locality and formation: North of Table Bay, Pistolet Bay, Portland Creek, Newfoundland; Quebec group.

If an imaginary circle, with half its diameter equal to the length of the gabella, be drawn with its centre in the middle of the occipital ring, it will intercept the eyes at their base. A measurement which agrees with Angelin's figures of *Cryptonymus verrucosus*.

PLATE I.

EXPLANATION OF PLATE I.

PHOTOGRAPHED FROM THE QUART. JOUR. OF THE GEOLOGICAL SOC. OF LONDON. VOL. VI, 1850. PLATE XXXII.

Fig. 1. CRYPTONYMUS PUNCTATUS, an adult specimen.

Fig. 1 a. The same specimen, under side of the cephalic shield showing the hypostoma, and the node against which it buts.

Fig. 1 b. The eye magnified, upper side.

Fig. 1 c. " " " lower side.

Fig. 1 d. The tenth thorax segment with spine on the axis ring.

Fig. 2. The same species, adult specimen.

Fig. 3. " " " the pygidium.

Fig. 4. " " " the under side of the thorax and pygidium, to show the bifid or notched terminations of the pleuræ and the manner in which they are facetted.

Fig. 5. Ditto, the hypostoma; the hooded tip is slightly recurved.

Fig. 6. CRYPTONYMUS VARIOLARIS, a young specimen.

Fig. 7. A rolled specimen.

Fig. 8. Ditto, nearly full-grown.

Fig. 8 a. Ditto, a side view of the same specimen.

Fig. 9. Ditto, a fine specimen; the thorax is slightly bent backward; it shows the sharpened front edges and notched pleuræ.

Fig. 9 a. Ditto, the under side of the cephalic shield of the same specimen; the hypostoma is not recurved at the tip, but regularly convex.

Fig. 9 b. Ditto, a few of the nodes with a punctum on each.

Fig. 10. Ditto, an under view, showing a similar structure to that represented at figure 4.

Fig. 17. CRYPTONYMUS PUNCTATUS. This fine specimen shows an anterior view of the course of the facial sutures. The figure is copied from Nieszkowski's Monograph of the Trilobites of the Silurian Formation in the Baltic Provinces.

PLATE II.

EXPLANATION OF PLATE II.

PHOTOGRAPHED FROM ANGELIN'S PALÆONTOLOGIA SCANDINAVICA, PLATE IV.

Fig. 1. CRYPT. (CYBELE) BELLATULUS, *Dalm.*

Fig. 2. Side view of the same, showing the attachment to the second pleuræ.

Fig. 3. The pygidium.

Fig. 9. CRYPTONYMUS OBTUSUS, a fragment showing part of the thorax with the pygidium.

Fig. 10. CRYPTONYMUS LÆVIS.

PHOTOGRAPHED FROM HALL'S PALÆONTOLOGY OF N. Y. VOL. I., PLATE LXV.

Fig. 2 a. CRYPTONYMUS VIGILANS, an entire specimen, preserving the posterior spines of the cephalic shield.

Fig. 2 b. Front view of the same, showing the elevation of the eyes.

Fig. 2 c. A small specimen.

Fig. 2 e. A pygidium of a larger individual.

Fig. 2 f. An enlarged portion of the cephalic shield of fig. 2 *a*, showing the nodes with the puncture at their apex. The eyes under an ordinary magnifying glass, present an irregular facetted appearance.

Fig. 2 g. The pygidium and part of the thorax enlarged, showing the nodes upon the alternate axis rings, and also those on every third axis ring of the pygidium.

Fig. 2 h. Profile view of the same.

PLATE III.

EXPLANATION OF PLATE III.

PHOTOGRAPHED FROM THE MEMOIRS, GEOL. SUR., UNITED KINGDOM. DECADE VII, PLATE IV.

Fig. 1. CRYPTONYMUS SEXCOSTATUS, a coiled specimen; from Rhiwlas. page 25.

Fig. 2. Ditto, back view, to show the 11 thorax segments.

Fig. 3. Ditto, showing the raised fascia *a*.

Fig. 4. Ditto, side view.

Fig. 5. Imperfect cephalic shield; the dotted lines are added from other specimens; the cheeks show the pitted surface.

Fig. 6. Magnified portion of cephalic shield.

Fig. 7. A thorax segment enlarged; at *a*, the fulcrum point; *b*, the facetted surface, and *c*, the blunt indented tip, as usual in the genus; they are represented by dotted lines.

Fig. 8. Side view of the pleuræ in a coiled state; at *a*, one of the facetted surfaces is seen by the breaking away of the other segments.

Fig. 9. Pygidium of a Rhiwlas specimen.

Fig. 10. Part of the same, magnified, to show the scabrous surface.

Fig. 11. Variety of the pygidium with 7 pleuræ. Rhiwlas.

Fig. 12. Internal cast of variety with the central part of the axis more free from ribs. Sholes Hook.

Fig. 13. Front view of the cephalic shield, slightly enlarged, of *Cryptonymus variolaris*, to show the course of the facial suture in front of the head, and the vertical suture *b*, which divides the cheeks, filled at its lower end by a narrow triangular rostral shield. Wenlock limestone of Dormington, Woolhope.

Fig. 14. The same, a side view; *a a*, facial suture.

Fig. 15. Under view, somewhat enlarged, of the pygidium of *Cryptonymus punctatus*, to show the incurved scabrous margin which unites the lateral ribs of the pygidium; their free points are seen projecting beyond it. Walsall, near Dudley.

Fig. 16. Hypostoma of the same enlarged; *a*, sinuated margin; *b*, cucullate base; *c*, the points of the extended base of attachment. Walsall.

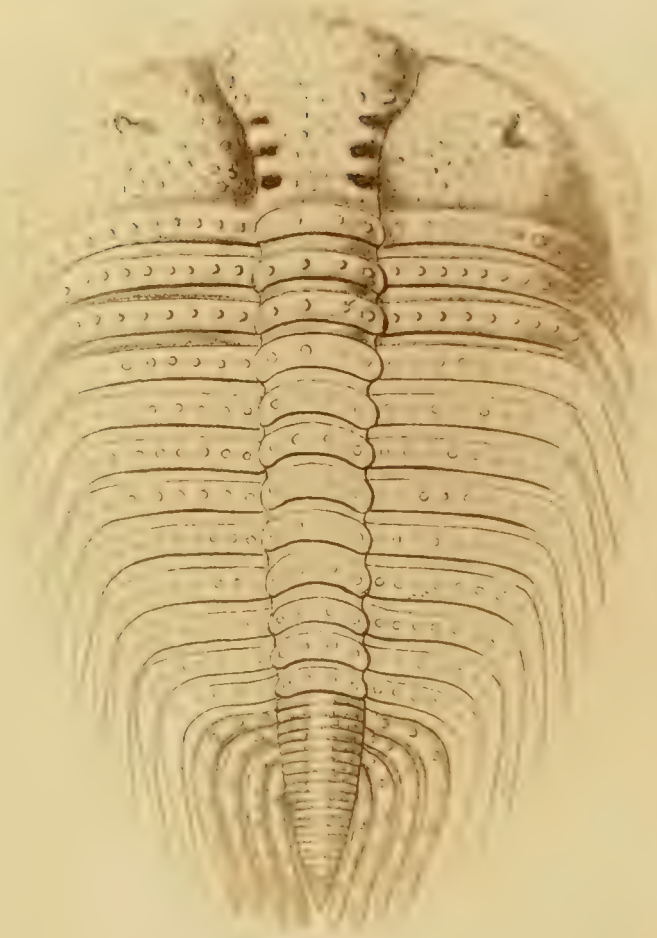
Fig. CRYPTONYMUS NEREUS. *Hall.* From the 20th Regents' Report, N. Y. State Cabinet, page. 24.

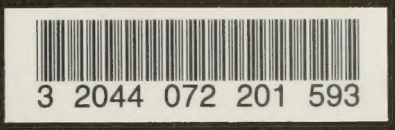
EXPLANATION OF PLATE IV.

PHOTOGRAPHED FROM ANGELIN'S PALÆONTOLOGIA SCANDINAVICA, PLATE V.

Fig. 1. CRYPTONYMUS (ATRACTOPYGÆ) VERRUCOSUS.

PLATE IV.

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